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MARKED AMENDED SPECIFICATION

On page 8, second full paragraph:

(c) two tubular tubesheets encapsulating both ends of the ~~said~~ hollow fiber bundle in a fluid-tight arrangement with one end of the inner core member opening out of one of the ~~said~~ tubesheets to permit flow of gas in and out of said inner core member and wherein at least one of said tubesheets is severed to permit unobstructed flow of gas in and out of the hollow fiber lumens,

On page 9, first full paragraph:

(c) two tubular tubesheets encapsulating both ends of the ~~said~~ hollow fiber bundle in a fluid-tight arrangement with one end of the inner core member opening out of one of the ~~said~~ tubesheets to permit flow of gas in and out of said inner core member and wherein at least one of said tubesheets is severed to permit unobstructed flow of gas in and out of the hollow fiber lumens,

On page 19, first full paragraph:

The cylindrical hollow fiber membrane cartridge 303 is connected in a sealed and removable manner by its first axial end 309 to the gas flow conduit 321 in the lid 305 and with its second axial end 310 to the waste gas outlet port 2308 in the bowl 304.

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AMENDED ABSTRACT PAGEABSTRACT OF THE DISCLOSURE

A hollow fiber membrane gas separation apparatus of a compact design suitable for separation and purification of gases is disclosed. The apparatus comprises an outer housing that consists of a detachable bowl and a head closure, and a removable hollow fiber membrane cartridge positioned therein. The cartridge contains a concentric tubular inner core member and is surrounded by a shell and at least one end closure. The cartridge is attached by its first axial end in a sealed and removable manner to a gas flow conduit positioned coaxially in the housing closure wherein ~~the said conduit is being~~ in fluid communication with a gas inlet or product gas outlet port formed in the housing head closure and by its second axial end to a waste gas exit port in the bowl. The feed gas inlet port and the product gas outlet port in the head closure are spaced in a straight line for a short overall distance providing for a linear connection with other components of a gas separation system, which is a preferred system component packaging.

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MARKED AMENDED CLAIMS

1. (Once amended) A hollow fiber membrane gas separation apparatus comprising (i) a housing body defined by an essentially cylindrical bowl connected in a sealed and removable manner in correspondence with its axial end portion to a lid, wherein said lid having formed therethrough a feed gas inlet port in a first end of said lid and an product outlet ~~product~~ port in a second end of said lid and a gas flow conduit positioned coaxially to said housing body such that said inlet port and said outlet port are spaced essentially in a straight line relative to one another, and said gas flow conduit is placed in fluid communication with said feed gas inlet port or said outlet port, and wherein said bowl being provided with a waste gas exit port placed coaxially to said housing body, and (ii) a substantially cylindrical hollow fiber membrane gas separation cartridge placed coaxially in said housing body and connected in a sealed and removable manner with its first axial end to said gas flow conduit in the lid and with its second axial end to said waste gas outlet port in the bowl said cartridge includes:

(ea) an elongated tubular inner core member,

(fb) a substantially cylindrical hollow fiber membrane bundle surrounding said inner core member constructed from hollow fiber membranes having permeate and nonpermeate sides, said bundle being characterized as having a substantially countercurrent flow arrangement between the gas flow on said permeate side and the gas flow on said nonpermeate side,

(gc) two tubular tubesheets encapsulating both ends of the said hollow fiber bundle in a fluid-tight arrangement with one end of the inner core member opening out of one of the said tubesheets to permit flow of gas in and out of said inner core member and wherein at least one of said tubesheets is severed to permit unobstructed flow of gas in and out of the hollow fiber lumens,

(hd) a shell and at least one end closure surrounding said hollow fiber membrane bundle.

3. (Once amended) The apparatus of claim 1 wherein said product outlet port is in fluid communication with said tubular core member in the hollow fiber membrane cartridge.

8. (Once amended) The apparatus of claim 1 wherein ~~the~~ said waste gas exit port is used to collect a product gas and ~~the~~ said product outlet port is used to remove a waste gas from said apparatus.

13. (Once amended) The apparatus of claim 1 wherein said second axial end of the cartridge is connected by a threaded connection to said waste gas outlet port in the bowl.

15. (Once amended) The apparatus of claim 1 wherein said apparatus is further connected through its feed entrance port to a prefiltration cartridge having a feed gas inlet port and filtered gas outlet port, and wherein said inlet port and outlet ports in said prefiltration cartridge are spaced essentially in a straightening line with said feed gas inlet and outlet ports in the gas separation apparatus.

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18. (Once amended) The apparatus of claim 1 wherein said hollow fiber membranes are coated along the entire length between said the terminal tubesheets except for a narrow region adjacent to one of said tubesheets.

19. (Once amended) The apparatus of claim 1 wherein said hollow fiber membrane bundle is encased with a nonpermeable wrap except for a narrow gap adjacent to one of said tubesheets.

26. (Once amended) A gas separation cartridge comprising:

(af) an elongated tubular inner core member,

(gb) a substantially cylindrical hollow fiber membrane bundle surrounding said inner core member constructed from hollow fiber membranes having permeate and nonpermeate sides, said bundle being characterized as having a substantially countercurrent flow arrangement between the gas flow on said permeate side and the gas flow on said nonpermeate side,

(hc) two tubular tubesheets encapsulating both ends of the said hollow fiber membrane bundle in a fluid-tight arrangement with one end of the inner core member opening out of one of the said tubesheets to permit flow of gas in and out of said inner core member and wherein at least one of said tubesheets is severed to permit unobstructed flow of gas in and out of the hollow fiber lumens,

(id) a shell and at least one end closure surrounding said hollow fiber membrane bundle,

(je) two connections at the terminal ends of said cartridge containing at least one gas flow channel positioned essentially concentrically to said bundle ~~body~~, said connections providing a fluid-tight and detachable seal to the axial ends of a substantially cylindrical external housing.

31. (Once amended) The hollow fiber cartridge of claim 26 wherein said hollow fiber membranes are coated along with entire length between the tubesheets except for a narrow region adjacent to one of said tubesheets.

33. (Once amended) The hollow fiber cartridge of claim ~~3826~~ wherein ~~the flow conduit in the tubular inner core member forms the said said gas flow channel in one or more of the first or second terminal connections of the cartridge.~~